organ. In that from Cresswell Crags, as well as those from La Madelaine, the jaw is heavier than in the recent specimen.

Brosely, August 29 W. W. WATTS

"The Ores of Leadville"

MY attention has lately been drawn to a review in NATURE for April 17 of a work on "The Ores of Leadville and their Mode of Occurrence," by Mr. L. D. Ricketts, from which one would be led to suppose that all the facts mentioned were due to original investigation on the part of the author. Your reviewer does not state that which is acknowledged by the author himself, namely, that much of his information was obtained from the Report of the U.S. Geological Survey by Mr. S. F. Emmons, contained in the Second Annual Report, published a year previously.

A large atlas has lately been issued also by the U.S. Geological Survey completely illustrating the Leadville ore deposits, and an exhaustive monograph to accompany it is now in the printers' hands. I speak from an intimate knowledge of the subject, having taken part in the work, and should be much obliged by your inserting this correction without delay.

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AUSTRALIAN ORCHIDS

THE seventh and last part of vol. i. of Fitzgerald's "Australian Orchids," and the first part of vol. ii. have lately reached us. The testimony we bore to the value and merits of this work in our notice of part 5, vol. i. (NATURE, vol. xxii. p. 53) we can now repeat, and with emphasis, as we can base it on an examination of all the parts at present issued.

Mr. Fitzgerald is an ardent admirer and disciple of Darwin—indeed what true lover of orchids is not?—and his work is dedicated to his memory "as a token of the veneration in which he holds that great naturalist and fearless expounder of science." The synopsis shows that twenty-eight genera and 104 species are illustrated and described in vol. i., each part containing ten folio lithographic plates. The drawings and dissections leave nothing to be desired in point of fulness, completeness, and accuracy, the latter especially being far more numerous and varied than in any similar work we are acquainted with. There is one point on which those who are responsible for the nomenclature of Australian orchids are entitled to decided praise. All but one of the genera and 90 out of the 104 species in vol. i. bear really descriptive names, instead of being christened after "enterprising," or rather advertising, nurserymen or vanity-stricken cultivators, which is unfortunately the fate of most of the new orchids introduced into England. A large proportion of the orchids as yet described in this work are natives of New South Wales, but a few are contributed by Western Australia, Queensland, South Australia, and Tasmania. The enormous importance of insects to the maintenance of orchids is shown by the fact that, out of 104 species described in vol. i., ten only are self-fertilising. But the curious point is noted by the author that "self-fertilising species always produce a far greater proportion of seed." The difficulty with which some genera undergo fertilisation is illustrated by an instance given where a splendid plant of *Dendrobium Hillii* in the Sydney Botanic Gardens, freely open to insects, did not produce a single seed, though covered with about 40,000 flowers on 190 spikes! In another case mentioned by the author he found a small caterpillar on a flower of *Dendrobium speciosum*, which had partly eaten an adjoining flower. He marked the latter, and the flower so marked was the only one on the entire plant which produced seed. There is strong evidence that many species are dependent, not simply on insects, but on some particular, perhaps local, insect for fertilisation. *Sarcochilus parviflorus* often produces seed capsules in its native habitat, the Blue Mountains; if removed to Sydney, it flowers well, but does not produce seed unless artificially fertilised. One question discussed by the author is the fertility of hybrid orchids. We believe that this question has been settled in English plant-houses, where hybrids have been proved to be fertile in the case of one genus (Cypripedium) at all events. This result is what Mr. Fitzgerald anticipates, on account of the facility with which species of the same genus may be cross-fertilised, however far apparently they may be removed from one another. As he says, "a repugnance to intermixture does not exist in this family as it does in others."

While terrestrial orchids are very numerous in Australia, epiphytal orchids are comparatively rare. The latter are more ordinarily denizens of the hot and moist forests of tropical or sub-tropical regions. Thus not more than one-fifth of the species illustrated in Mr. Fitzgerald's work are epiphytal, and these belong almost entirely to the genera Sarcochilus and Dendrobium—the latter a genus of which there are probably two or three hundred species, mostly natives of Indo-Chinese regions, cultivated in this country. On the other hand, the author says:—"The centre of the terrestrial" (orchids) "may, I think, be placed in Sydney, where, within the radius of a mile, I have obtained 62 species of orchids, 57 of which were terrestrial—a number that could not, I believe, be equalled in any part of the world within a similar area."

The plates are accompanied by full descriptions giving curious and interesting details as to the methods of insect-fertilisation, and describing localities, surroundings, conditions of growth, &c. Notwithstanding the help derived from this source, Australian orchids have not, with some few exceptions, proved readily amenable to cultivation in this country. While it is comparatively easy to reproduce climates resembling those of the damp, shady, and hot valleys of the Amazon or of Burmah, or of the moist, cloud-covered, and cool slopes of the Andes or the Himalayas, it is very difficult to reproduce the dry, hot, and sunny conditions favourable to most of the terrestrial orchids of Australia. We shall therefore probably continue to know these for some time at least mainly from Mr. Fitzgerald's book. We doubt whether, excellent and obviously faithful as his drawings are, and carefully as they are coloured, the use of toned paper is judicious. It imparts a muddiness to the tints, as, for example, in the drawing of the beautiful Dendrobes, Phalænopsis, and Superbiens, part 7, vol. i., and part 1, vol. ii., where neither foliage nor flower have the clear bright colours natural to them.

Before concluding this notice of a work which devotes much attention to the curious and interesting study of orchid fertilisation, we might refer for a moment to the patience, care, and intelligence with which the raising of hybrid orchids is being prosecuted in this country, especially in the nursery of Messrs. James Veitch and Sons. In one genus, that of Cypripedium, the hybrids bids fair already to outnumber the known natural species, as well as to rival them in interest and beauty. The closely allied genera Cattleya and Lælia, which are distinguished only by the number of their pollen masses, have proved susceptible of cross-fertilisation, and have produced several intermediate hybrids of great beauty. It may well be said that patience is necessary for this work, for *Cattleya exoniensis*, the offspring of *Cattleya Mossiæ* and *Lælia purpurata*, did not flower until seventeen years after the seed had germinated. Even now it is only propagated by subdivision. The union of the genera Calanthe and Limatodes was more speedily fruitful; and the beautiful *Calanthe Veitchii*, especially valuable horticulturally, from its winter-flowering habit, is known in most gardens.

Few who have devoted themselves to the study or to the cultivation of orchids have failed to become greatly interested in this remarkable family. Their singular

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structure, their extraordinary variety and diversity, their beauty, form great attractions. To these may now be added the interest, indeed excitement, to be obtained by intelligent and judicious cross-fertilisation. Altogether we need not wonder that the cultivation of orchids is spreading rapidly among the garden-loving people of these isles. For they interest equally the man of science and the gardener. We trust that Mr. Fitzgerald may bring his labour of love to a successful termination, and that descriptions of the orchids of other parts of the world, equally complete, accurate, interesting, and intelligent, may be taken in hand by botanists equally competent and enthusiastic. T. L.

GRINNELL LAND

THE following is the *Times* report of the paper read by Lieut. Greely at the British Association on Tuesday on some of the results of his recent Arctic expedition :—

Lieut. Greely stated that the geographical work of the Lady Franklin Bay Expedition covers nearly 3° of latitude and over 40° of longitude. Starting from lat. 81° 44′ N., long. 84° 45′ W., Lieut. Lockwood reached, on May 18, 1882, on the north coast of Greenland, lat. 83° 24′ N., long. 40° 46′ W. From the same starting-point he reached to the south-west, in May 1883, in Greely Fjord, an inlet of the Western Polar Ocean, in lat. 80° 48′ N., long. 78° 26′ W. The journey to the northward resulted in an addition to our charts of a new coast-line nearly 100 miles beyond the furthest point seen by Lieut. Beaumont of the Royal Navy. It also carried Greenland over forty miles northward, giving that continent a much greater extension in that direction than it had generally been credited with. The furthest point seen on the Greenland coast was estimated at about lat. 83° 35′ N., long. 38° W. There were no indications that the furthest point seen was the northern termination of Greenland. The newly-discovered coast resembled in many respects that of Southern Greenland ; the mainland was intersected by many deep fjords, with numerous outlying islands. The interior of the country, as seen from an elevation of some 2000 feet, consisted of confused masses of mountains, eternally snow-clad or covered with ice-caps. The fjords presented to the eye nothing but broad, level expanses of snow and ice, being devoid of any marked ice-foot, floebergs, pressed-up hummocks, or any other indications tending to prove their direct connection with the Spitzbergen Sea. In general, the immediate coast was high, rugged, and precipitous ; the formation very like that around Discovery Harbour—schistose slate, with a sprinkling of quartz. The vegetation resembled closely that of Grinnell Land. Among the specimens brought back is the Arctic poppy. Several saxifrages were identified above the 83rd parallel. Traces of the Polar bear, lemming, and Arctic fox were seen. A hare and ptarmigan were killed at the furthest north, and the snow bunting was heard. A remarkable fact noted was the existence of a tidal crack—so called for lack of a better name—which extended from Cape Bryant along the entire coast, running across various fjords in a direct line from headland to headland, varying from one yard to several hundred yards in width. Inside the crack, rough hummocky ice was but rarely seen, while outside prevailed the palæocrystic ice, over which Commander Markham struggled so manfully and successfully in his wonderful journey of 1875, midway between Capes May and Britannia. A sounding was made, but no bottom was found at 800 feet. Apparently no current existed. It may be well to state that the latitude of the furthest northern point, Lockwood Island, was determined by a set of circum-meridian and sub-polar observations, which were reduced by the Gauss method. The latitude of Cape Britannia and several other points was determined by circum-meridian observations. It affords me pleasure to testify to the accuracy of Lieut. Beaumont's maps ; the only correction made places Cape Britannia a few miles south and Cape May a few miles west of their assigned positions. These points were located by Lieut. Beaumont from bearings. His comparative exactness was remarkable considering the disadvantages under which he laboured. The journeys made by Lieut. Lockwood and myself across Grinnell Land into its interior revealed striking and peculiar physical conditions which have been hitherto unsuspected. Between the heads of Archer and Greely Fjords, a distance of some seventy miles, stretches the perpendicular front of an immense ice-cap, which follows closely from east to west the 81st parallel. Its average height was not less than 150 feet. The undulations of the surface of the ice conformed closely to the configuration of the country, so that the variations in the thickness of the ice-cap were inconsiderable in about sixty miles. But two places were found where the slope and face were so modified as to render the ascent of the ice possible. This ice-cap, extending southward, covers Grinnell Land almost entirely from the 81st parallel to Hayes Sound, and from Kennedy Channel westward to Greely Fjord on the Polar Ocean. The glacier discharging into Dobbin Bay is but an offshoot of this ice-cap. Without doubt glaciers can be found at the head of every considerable valley debouching into Richardson, Scoresby, or other bays. Several valleys which were visited during the retreat southward displayed at their entrances evident signs of such occupancy in the past. In July I was fortunate enough to ascend Mount Arthur, the summit of which is 4500 feet above the sea. The day was very clear ; to the northward of Garfield Range a similar ice-cap appeared to view, from which extensive glaciers projected through every mountain gap. One of these, Henrietta Nesmith Glacier, had been visited by me in the preceding April, and was found to have a perpendicular face of about 200 feet. It discharged into a small bay, part of Lake Hazen. Gilmar, Abbé, and other glaciers feed the streams which empty into that lake. Similarly glaciers were found at the head of the rivers discharging into St. Patrick and Lincoln Basins, Norris Bay, and Discovery Harbour. From these indications I estimate the northern ice-cap of Grinnell Land as not far from 6000 miles in area. This southern limit closely coincides with the 82nd parallel. The country between the 81st and 82nd parallels, extending from Kennedy and Robeson Channels to the Western Polar Ocean, was found in July entirely free from snow, except on the very backbone. In over 150 miles travel into the interior my foot never touched snow. Vegetation abounded, being exceedingly luxuriant as compared with Cape Hawkes, Cape Sabine, or other points further south visited by me. Dead willow was found in such abundance as to serve for fuel in more than one instance. Willow, saxifrages, grasses, and other plants grew in such profusion as to completely cover large tracts of ground. These valleys afford excellent pasturage for musk cattle, which feed towards the sea coast during summer, but withdraw to the interior as winter advances. I frequently noted evidences of recent elevation above the sea of the region now free from ice-cap. Such indications consisted of raised beaches, marine shells, and driftwood. At one place the trunks of two large coniferous trees were found in such a state of preservation as to allow of their use for fuel. It seems probable that these ice-caps were originally united. It is certain that both the northern and southern ice-caps have recently retreated, even if such a process is not going on now. Along the frontier of the southern ice were found many small glacial lakes and moraines. To the north, Lake Hazen for some fifty miles borders the ice-cap. In front of Henrietta Nesmith Glacier there were three parallel moraines. Between the face of the glacier

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